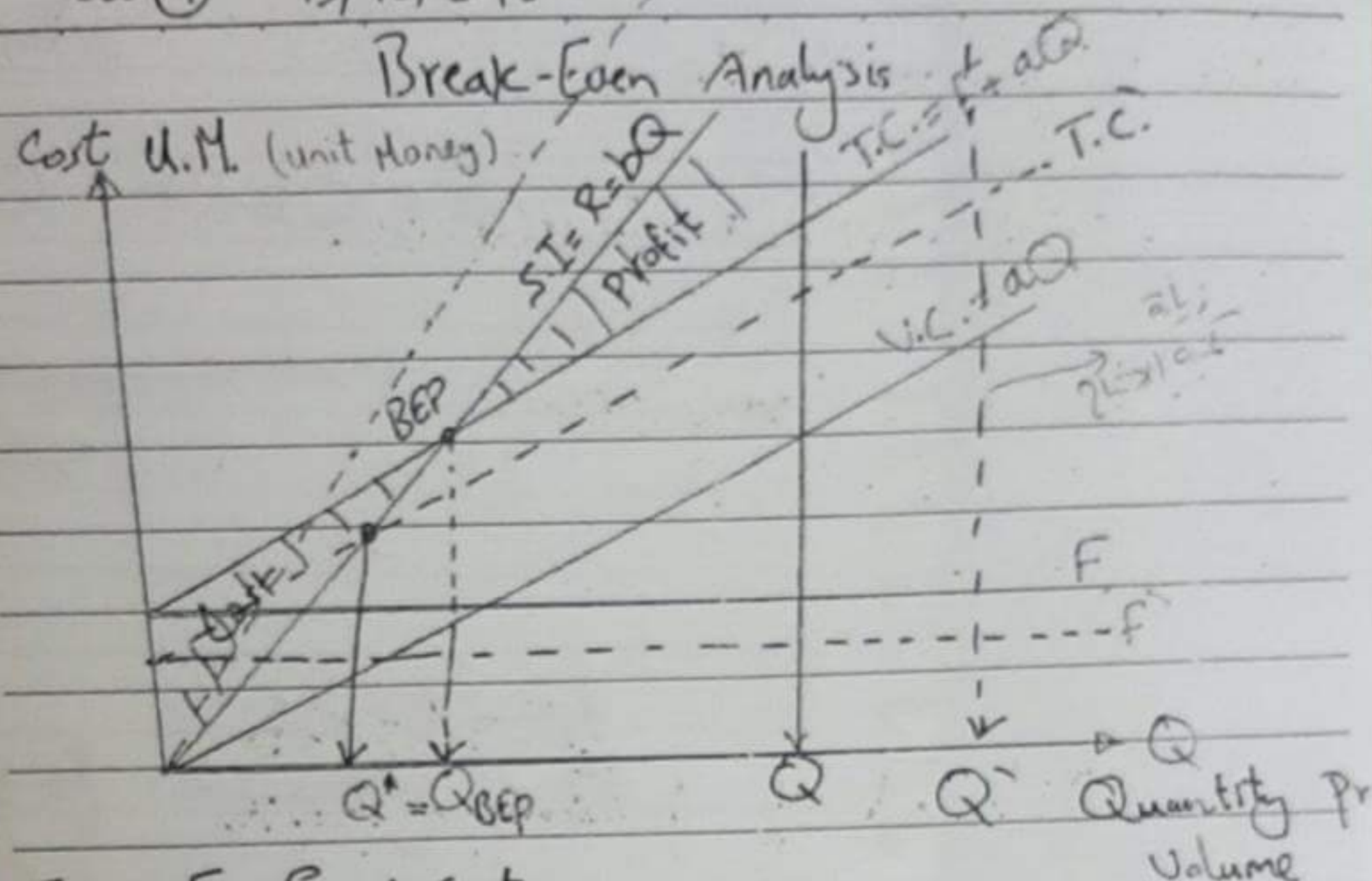


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PAGE  
DATE

(1)



F.C. = F = Fixed costs

= O.H. Expense + Factory Exp. + Admin. Expense +  
Selling Expense  
or sales costs

$V.C. = D.C. =$   $\begin{cases} \text{Matls costs} \rightarrow D.M.C \\ \text{Labor costs} \rightarrow D.L.C \end{cases}$

$\therefore$  Total cost  $\Rightarrow T.C. = F + V.C.$

or  $a = V.C. / \text{Piece} \times Q \rightarrow V.C. = aQ$

$b = S.I. / \text{Piece} \rightarrow \therefore$  Revenue =  
Sales Income = }  $b \cdot Q$   
Selling Price =



$$\text{Revenue} = \text{T.C.} + \text{Profit}$$

$$\text{S.I. or R} = bQ = F + aQ + Z$$

- Break-Even Diagram (or chart).
- For one product.
- Balancing.

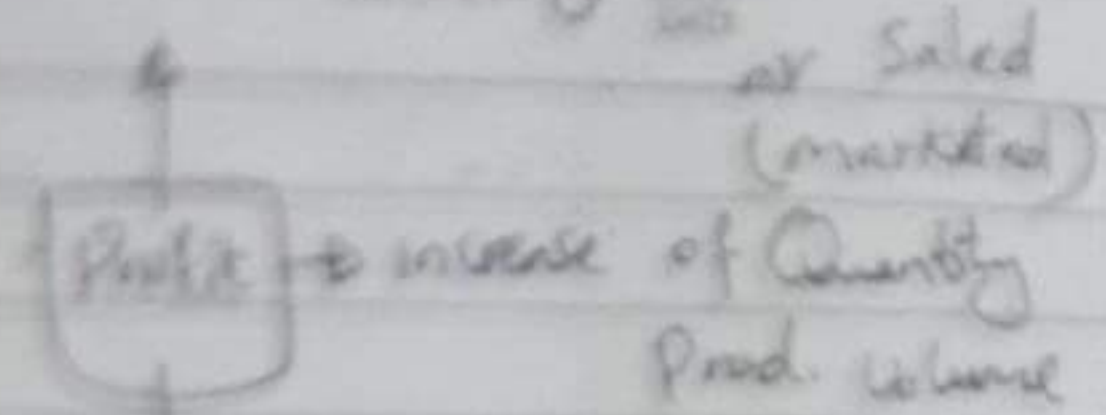
طرق زيادة الربح  
→ Methods of Increasing Profit

- ١- تقليل التكاليف الكلية للمنتج الواحد.
- ٢- زيادة الكمية المنتجة production volume
- ٣- زيادة سعر البيع



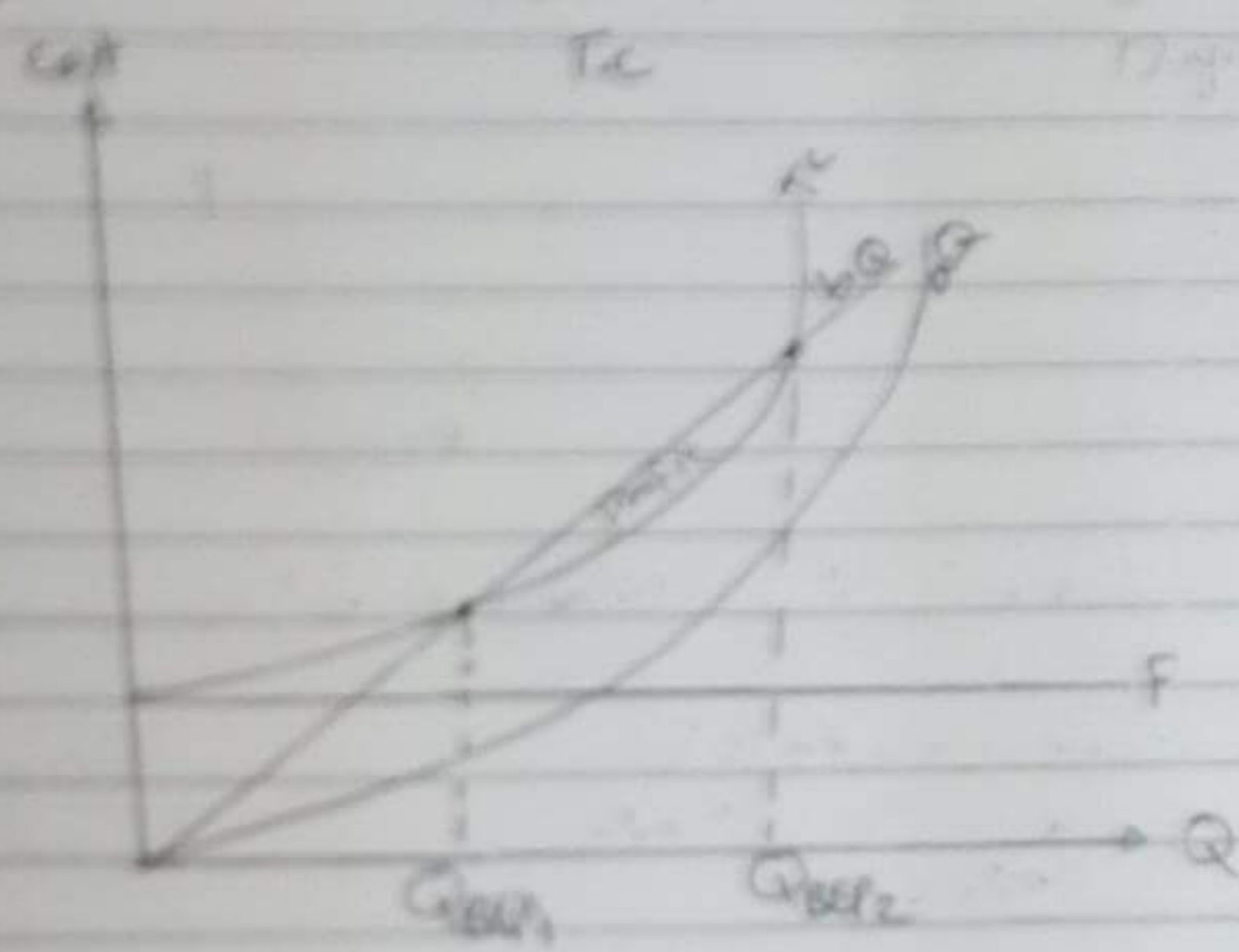
Increase the Sales Price

Quality  $\rightarrow$  or Sold (marketed)



Reduce of TC

Profit  $\rightarrow$  Profit even 12.9



$$Z = bQ - TC$$

$$= bQ - (aQ + F)$$

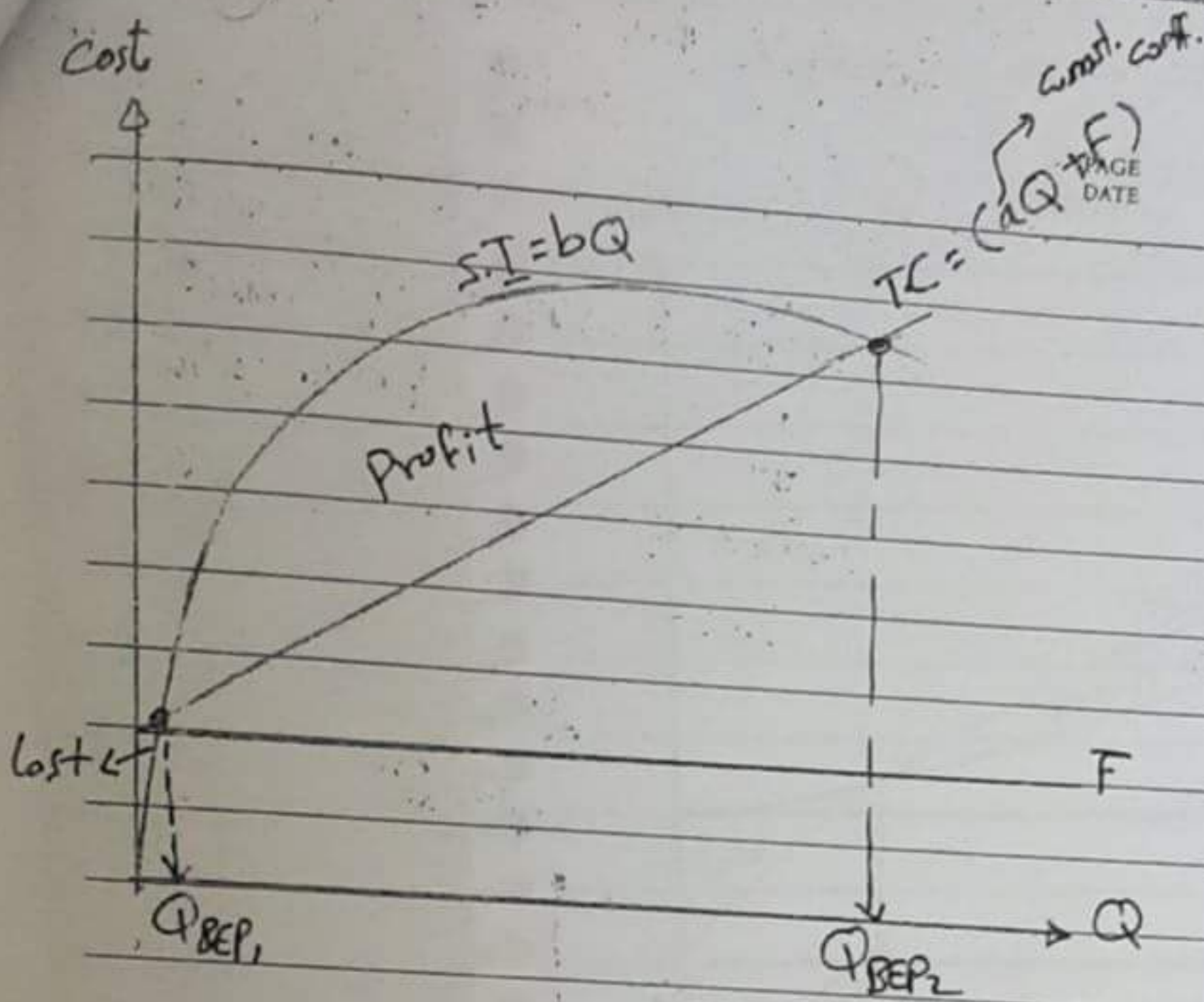
$\frac{dZ}{dQ}$

$\rightarrow$  Curvature  $\rightarrow f(Q)$

at max value

$$\frac{dZ}{dQ} = 0 \rightarrow Q_{1/2}$$





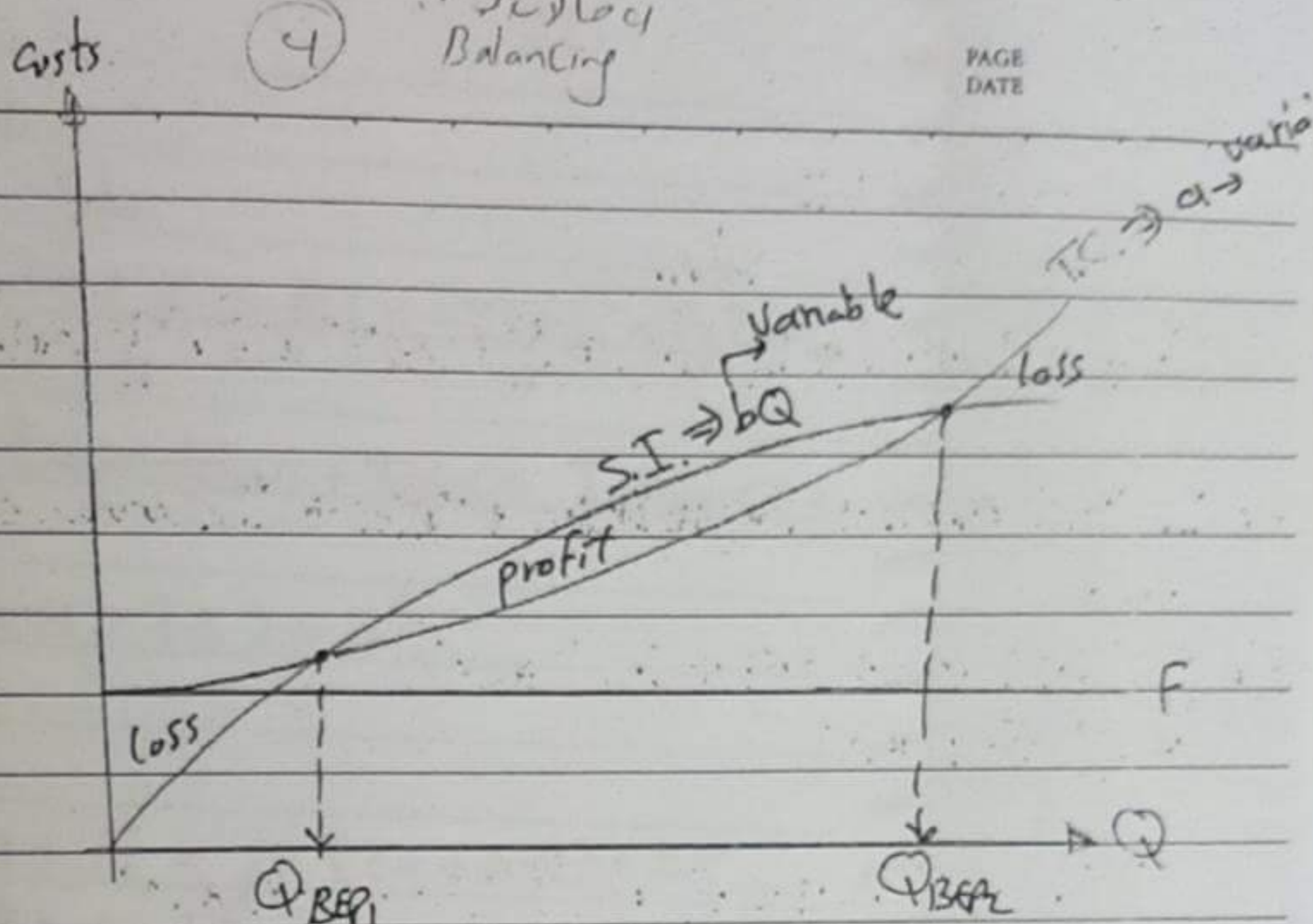
$$S.I. = bQ \rightarrow b = \text{variable} = f_v(Q)$$

$$Z = \underset{\substack{\downarrow \\ \text{variable}}}{bQ} - (F + \underset{\substack{\downarrow \\ \text{const.}}}{aQ})$$

$$\text{at } Z_{\max} \quad \frac{dZ}{dQ} = 0 \rightarrow Q_{I,II}$$



4

PAGE  
DATE

$$Z = bQ - (aQ + F)$$

variable

↳ variable

EX:- Data

$SI = R$  Total Sales = \$40 \times 10^6

Vc Direct labor = \$12 \* 10<sup>6</sup>

Indirect labor = \$ 2 \* 10<sup>6</sup>

VC Direct Material = \$ 8406

F Depreciation = \$ 1 x 106

$$F \text{ Taxes} = \$10.5 \times 10^6 = \$15 \times 10^5$$

$$F_{\text{Insurance}} = \$4 \times 10^5$$

F sales cost = \$1.5 \times 10^6



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PAGE  
DATE

$$Q = 100000 \text{ units}$$

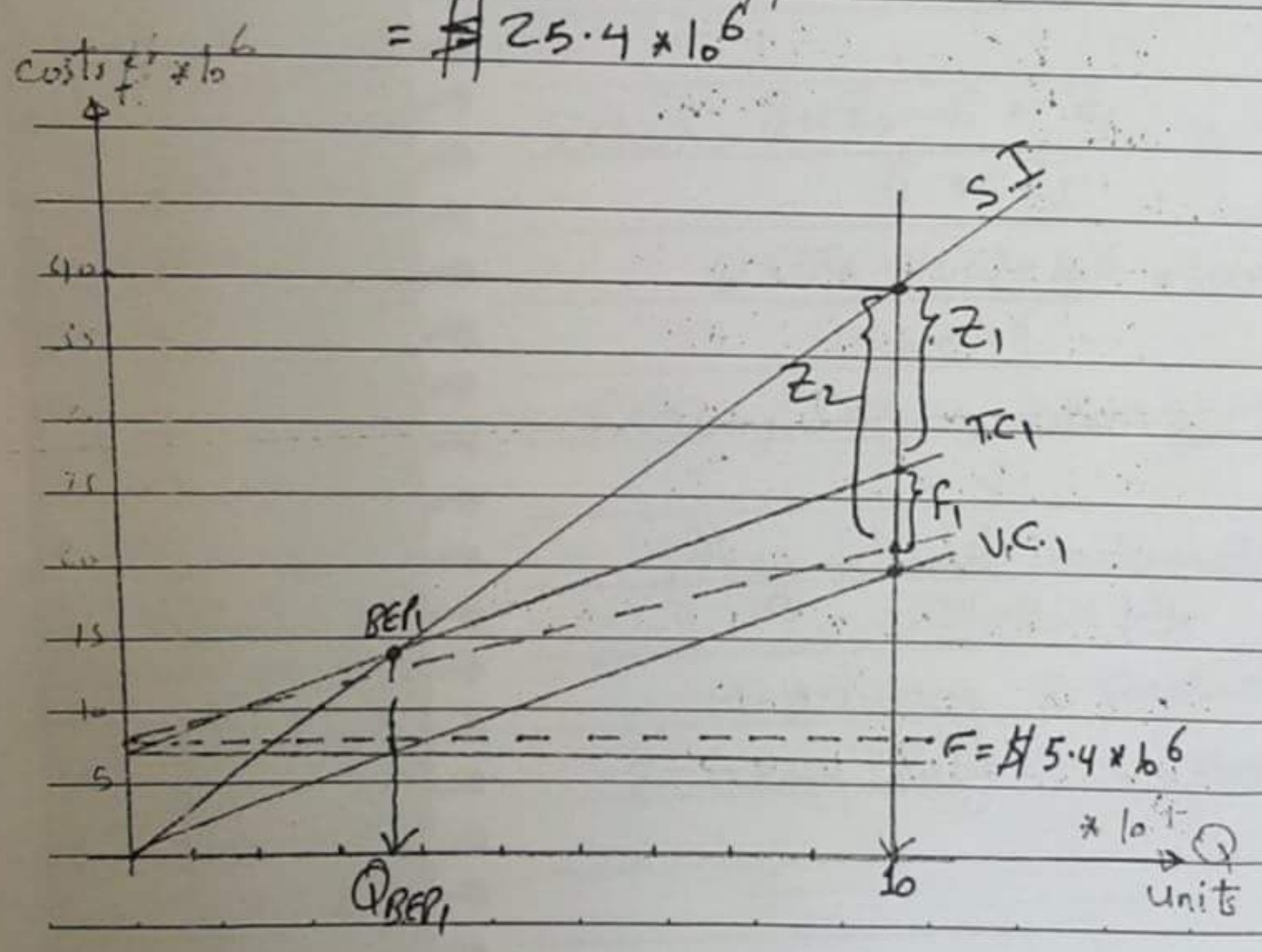
Soln.

$$V.C._1 = D.N.C + D.L.C = \$ (12+8) \times 10^6 = \$ 20 \times 10^6$$

$F_1 = \text{Indirect m.c.} + \text{Depreciation} + \text{Taxes} + \text{Insurance} + \text{S.C.}$

$$F_1 = \$ (2+1+0.5+0.4+1.5) \times 10^6 = \$ 5.4 \times 10^6$$

$$T.C._1 = V.C._1 + F_1 = \$ (20+5.4) \times 10^6 = \$ 25.4 \times 10^6$$





For second case.

$$F_2 = F_1 + \$1 \times 10^6 = \$6.4 \times 10^6$$

$$V.C.2 = \$20 \times 10 \times \frac{70}{100} = \$14 \times 10^6$$

$$T.C.2 = F_2 + V.C.2 = \$20.4 \times 10^6$$

$$Z_1 = \$40 \times 10^6 - \$25.4 \times 10^6 = \$14.6 \times 10^6$$

$$Z_2 = P_2 = \$40 \times 10^6 - \$20.4 \times 10^6 = \$19.6 \times 10^6$$

$$\text{Return} = \frac{P_2 \text{ or } Z_2 - P_1 \text{ or } Z_1}{P_1 \text{ or } Z_1} \times 100\%$$

$$= \frac{(19.6 - 14.6) \times 10^6}{14.6 \times 10^6} \times 100 = 34\%$$

$$\text{Return, } 20\% \rightarrow \text{Return } 34\%$$

→ they should automate. بمعنى التماثل  
في النظام الآلي

- 1- accuracy    2- productivity
- 3- heavy duty    4- good modes
- 5-



EX:- Data Given a nonlinear Price function of  
 $b = 21000 Q^{-\frac{1}{2}}$  L.E. Per unit

$a = 1000$  L.E. Per unit

$F = 1000000$  L.E. per Period

\*Required ① BEP

② production level for max. Profit.

$$b(Q) = Q [21000 Q^{-\frac{1}{2}}] \xrightarrow{\text{sol.}} \text{L.E.} \\ = 21000 Q^{\frac{1}{2}}$$

$$Z = bQ - T.C \\ = 21000 Q^{\frac{1}{2}} - aQ - F$$

$$= 21000 Q^{\frac{1}{2}} - 1000 Q - 1 \times 10^6$$

$$\text{at max Profit} \rightarrow \frac{dZ}{dQ} = 0$$

$$\frac{dZ}{dQ} = 0 = \frac{21000}{2} Q^{-\frac{1}{2}} - 1000$$

$$\frac{21000}{2} Q^{-\frac{1}{2}} = 1000 \rightarrow Q^{-\frac{1}{2}} = \frac{2}{21}$$

$$Q^{\frac{1}{2}} = \frac{21}{2} \rightarrow Q = (10.5)^2 = 110.25$$

$$\therefore \text{at } Q = 110.25 \rightarrow Z_{\max}$$



and construct the Break-even chart.

